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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,588	10/16/2003	Chia-Lin Hsu	025796-00009	5130

7590 03/22/2005

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EXAMINER	
EVERHART, CARIDAD	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/685,588	HSU ET AL.	
	Examiner	Art Unit	
	Caridad M. Everhart	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The recitation "to remove redundant patterned mental(sic) structure" is not supported by the specification. On page 9, lines 5-10 of the specification it is disclosed that the portion removed is not patterned.

Claim Objections

Claims 1-15 and 20-21 are objected to because of the following informalities: The typographical error "mental" instead of "metal" appears repeatedly in the clailms. The typographical error "explored" appears repeatedly in the claims. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6,9-12,15-24 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Mayer, et al (US 6,309,981B1).

Mayer, et al. discloses forming metal interconnect pattern on a wafer. A thin barrier layer is first formed which may be tantalum or tantalum nitride(col. 5,lines 18-24) and may be formed by PVD(col. 5,lines 28-32). Copper may be used for the metal pattern(col. 5, lines 15-19). The copper may be formed by PVD(col. 5,lines 39-41). CMP may be used to planaize the metal(col. 5,lines 57-60). The process further includes the removal of unwanted metal by edge bevel removal and/or backside metal removal(col. 5, lines 42-45). The removal may be done by an acid solution such as nitrid acid (col. 12, lines 14-19 and col. 13, lines 36-43 and col. 14, lines 1-7). A drying step is also taught (Figure 2B, step 212).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7,8,13-14,26-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer, et al as applied to claim 1 above, and further in view of Emami et al (US 6857941).

Mayer, et al does not teach the polishing as the method of removal of the edge bead and backside unwanted metal nor the drying of the wafer.

Emami et al disclose the chemical-mechanical polishing of the edge of a wafer(col. 8, lines 63-65). The polishing solution may be a slurry(col. 7, lines 29-40 and col. 13, lines 40-45).

It would have been obvious to one of ordinary skill in the art at the time of the invention that the teachings of Mayer, et al could be combined with the teachings of

Emami, et al because the edge bead removal could then be done with the polishing apparatus.

Claims 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer et al as applied to claim 1 above, and further in view of Vines et al (US 6048789).

Mayer et al is silent with respect to nitric and hydrofluoric acid solution.

Vines et al teach that nitric and hydrofluoric acids are useful for cleaning wafers after CMP in the formation of metallization(abstract and col. 5,lines 1-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the step taught by Vines et al with the process taught by Mayer et al teach that other acid washes may be used including nitric acid(col. 14, lines 1-7).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer et al as applied to claim 1 above, and further in view of Kaufman, et al (US 2004/0009671A1).

Mayer et al is silent with respect to the pH of a slurry for the CMP step.

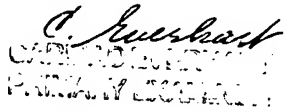
Kaufman et al teach the pH for removal of excess metal between 5.0 to 9.0, which overlaps the recited range.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the pH taught by Kaufman et al in the process taught by Mayer et al in order to remove the excess metal in the pH range which is taught by Kaufman et al to be preferred for copper.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



C. Everhart
3-17-2005